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Celebrating the 44th Araw ng Arsenal — October 12, 2011

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Republic of the Philippines
Department of National Defense
Office of the Secretary



MESSAGE

I convey my warmest greetings to the men and women of the Government Arsenal (GA) on the occasion of your 44th Anniversary.

Your anniversary theme, "**GA Modernization... An Accurate Shot to the Future**," vividly depicts the strong determination and continuing efforts of all the stakeholders to modernize and streamline the Government Arsenal towards better quality and sufficient small-arms ammunition for government forces. Towards this end, it behooves everyone involved in this undertaking to live up to the high expectations of our people in our government workers, more especially those assigned to the defense and military establishments.

I am confident you will continue to perform your assigned tasks to the best of your abilities and knowledge and ensure the success of our modernization efforts.

Congratulations and best wishes on your anniversary celebration!



VOLTAIRE T. GAZMIN
Secretary

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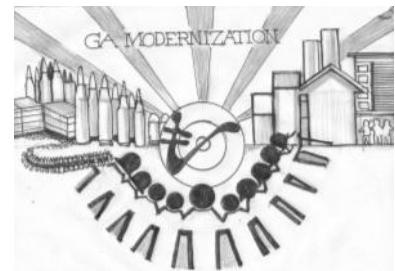
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EDITORIAL

Strengthening our endeavor at forty-four...



Celebrating its 44th Founding Anniversary, the GA is in the stage of existence where it must strengthen and pursue its endeavor towards modernization, especially, for the eventual acquisition of a complete line of production machines and exploring other capability upgrade projects.

Having hurdled 44 years of existence faced with budgetary constraints, aging equipment and problems in the procurement and delivery of imported raw materials, the GA likewise has to cope with the challenge of training and mentoring the new breed of engineers and technical people in the plant operations and troubleshooting.

At 44, majority of the GA workforce are now in the 50-60 age bracket, and the Management sees the need to adequately prepare the newly hired engineers, technical people and operators for them to acquire the necessary skills and experience unique and distinct to GA as a government institution involved in ammunition manufacturing. This, it is doing right now. It is the most valuable legacy that the pioneers of GA could impart to the new generation. (TLV)

Government Arsenal (GA) M-16 Manufacturing Project

By: MGen Jonathan C Martir AFP (Ret)

Background:

In 1976 the M-16A1 service rifle manufacturing program which was undertaken by Elisco Tool Manufacturing, Co. (Elisco) for the Philippine Government was completed. In the years thereafter, no further production took place.

In 2010, the Government Arsenal (GA) embarked on a program to undertake in-house production of a 5.56mm line of rifles based on the AR-15 (M-16) rifle system. This new line is intended to meet the requirement of the Armed Forces of the Philippines (AFP) for service rifles and other special purpose rifles.

The rationale for the project is for the Government of the Republic of the Philippines to establish its own in-house production line that is independent of outside manufacturers for rifles to meet the continuing requirements of its security services following the closure of the M-16A1 manufacturing line of Elisco. This would enable the Philippine Government to be self-sufficient in meeting its small arms requirements. It would also provide the foundation for further research and development in small arms.

In the past, the AFP SRDP embarked on the production of service rifle requirements with Elisco, which was manufacturing the M-16A1 under license from Colt Industries of Hartford, Connecticut, USA. By 1986, production of M-16A1s by Elisco had ceased. No further production was forthcoming since Elisco as a firm, had ceased operations. Thereafter, the major services had met their requirements in part, by replacing worn parts and components from whatever stocks had remained and were accessible. Subsequently, rifle procurement was undertaken in smaller batches by the major services because of the lack of resources to acquire the equipment to manufacture larger quantities of parts and components or acquire a larger volume of completed rifles.

The M-16 manufacturing project as envisioned by GA is thus intended to address the continuing requirements of the Philippine Government in a way that is more sustainable and cost-effective in the long term through in-house production at GA in Limay, Bataan through the acquisition of the necessary equipment and machinery.

This undertaking will provide the foundation for a 5.56mm X 45, gas-operated rifle to meet the requirements of the AFP and other agencies.

The project is to be undertaken in-house at GA upon acquisition of manufacturing equipment at no cost to GA as part of a joint venture or similar agreement with another entity, most likely of foreign origin.

Costs are estimated at P1.4 B for the joint venture with no cost to GOP from Years 1-5.

An annual production rate of 20,000 units is envisioned to meet AFP and PNP requirements, initially.

Rifle specifications:



General characteristics: The rifle of choice is based on the M-16 service rifle using the same direct gas impingement system from the original M-16A1 up to the M-16A2 and A4 service rifles.

The M-16 system was chosen by GA, since to date, there are no other service rifles that have been determined to have any significant advantages to warrant large scale replacement of the M-16 system. This has been the case with the United States which spent many years evaluating possible replacements for the M-16, and yet has retained it to date. From the original AR-15 designed by Eugene M Stoner and introduced in 1964 as the M-16 and subsequently as the M-16A1, and its many variants through the years, the M-16 system is the longest serving rifle system of the United States military. Furthermore, the continuing use of the M-16 system will enable the Philippines to capitalize on

its existing expertise which has been built up over time with the system. By retaining the M-16, it would not be necessary to change the training, maintenance and logistics infrastructure, which the adoption of a different service rifle system would require.

The proposed service rifle system will use the 62 gr M855 5.56 X 45 as its primary cartridge in a chrome moly barrel with a 1:7 right hand twist and chrome-lined chamber. Such barrel twist will also facilitate the use of cartridges with heavier heads such as the 77gr Mk 262 Model 0, particularly in the Designated Marksman Rifle (DMR)/ Special Purpose Rifle (SPR) variant.

The choice of the 5.56mm NATO cartridge is also intended to facilitate interoperability with US forces and other countries which have adopted the said cartridge which is compatible with barrels using a 1:7 right hand (RH) twist. All barrels and bolts will be proof-tested and magnetic-particle-inspected to mil-spec standards.

The proposed manufacturing line will produce rifles in the following three (3) basic configurations:

1. Recon/SOF model: Barrel: 14.5 inch standard contour heavy barrel with 1:7 RH twist and cut down for a grenade launcher; GA muzzle brake; flattop upper receiver with a fixed cartridge case deflector, forward bolt assist, Picatinny rail with mil standard 1913 STANAG 4694 compliant rail spaces; detachable carry handle with A2 sights, flip-up front sights; and rail adaptor system (RAS) with mil standard 1913 STANAG 4694 compliant railspaces on the handguard, provisions for SOPMOD accessories; M4 4-position telescoping stock, semi and select fire.

This version essentially adheres to the M-4A1 system as used by most Western and allied Special Operations Forces (SOF).

2. Service Rifle model: 16 inch standard contour barrel

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UPDATES ON THE GA MODERNIZATION

With fund support coming from the AFP Modernization Act Trust Fund (AFPMATF), the bidding for the four (4) units case manufacture and cartridge assembly machines with a total ABC of Php 306M was conducted by the DND BAC on June 2, 2011, whereby after thorough evaluation of the bids submitted, Waterbury Farrel, a division of Magnum Integrated Technologies Inc. of Canada was declared to have submitted the lowest calculated bid (LCB). Similarly, on June 23, 2011, the DND BAC conducted the bidding for the acquisition of 5.56mm Multi-station Bullet Assembly Machine with an ABC of Php 82M, and Waterbury Farrel, being the lone bidder, was determined to be the single calculated bidder.

A team composed of GA-DND officials/personnel headed by ASEC Patrick M Velez, then Vice Chairman of the DND BAC, conducted the post-qualification on Waterbury Farrel at Brampton, Ontario, Canada on July 21-31, 2011. Upon verification from various sources of the documents submitted during the bidding and ocular inspection of its manufacturing facility, the team was convinced that the winning bidder is indeed capable to undertake the project and therefore, was rated to have "passed" the post qualification stage. The Notice of Award (NOA) was consequently signed by the SND on September 7, 2011, in favor of Waterbury Farrel and the necessary contracts between the GA-DND and Waterbury Farrel are now being prepared after posting the required performance bond.

On the other hand, the bidding for the acquisition of Packing Machine integrating the laser etching technology on the individual cartridges, was conducted on August 18, 2011 but was declared failure, in the absence of qualified bidder. As a result thereof, the technical specifications of the equipment is now being reviewed by the GA TWG/PMT and the Director, GA will submit its recommendation to SND, including the appropriate mode of procurement. The GA is likewise in coordination with the Office of the Assistant Secretary for Acquisition, Installations and Logistics, for another project to be bid, i.e., the preparation of GA's Master Development Plan, which is necessary in order to identify the appropriate sites for future locators in the defense industrial estate.

Meanwhile, the proposed GA Modernization Bill which is now known as House Bill No. 76 has been filed anew in the House of Representatives by Congressman Albert S. Garcia of the Second District of Bataan. The proposed legislation with budgetary requirement of six billion three hundred forty million pesos (P6.340B) includes four (4) phases, i.e. Phase I – Enhancement of capacity in the production of small arms ammunition; Phase II – Development of capability on weapons manufacture; Phase III – Establishment of various munitions testing facilities and Phase IV – Development of capability to manufacture medium and large caliber ammunition. (by Mr. Roger S Gamban)

BALLISTIC GELATIN

One of GA's R&D projects is the development of ballistic gelatin which is intended to be an additional tool for ballistic test. This joint project of Engineering Division and Quality Assurance Division is designed to simulate living soft tissue. It is a standard for evaluating the effectiveness of firearms against humans because of its convenience and acceptability over animal or cadaver testing. While ballistics gelatin does not model the structure of the body, including skin and bones, it works fairly well as an approximation of human tissue and provides similar performance for most ballistic testing. Ballistic gelatin is used rather than actual muscle tissue due to the ability to carefully control the properties of the gelatin, which allows consistent and reliable comparison of terminal ballistics.

The motion of a bullet in a dense medium such as gelatin or tissue is determined by the Newtonian and viscous forces on the bullet that are in turn influenced by the shape and composition of the bullet. The Newtonian forces are imparted to the bullet by the rapid expansion of the gases in the firing chamber. The viscous forces that slow the bullet result from the motion of the bullet through the medium in which it travels.

As the bullet moves down the barrel of the weapon it engages the raised areas of the barrel (lands) that are designed to spin the bullet to impart a gyroscopic stability to the bullet's trajectory. Ballistic gelatin is about 800 times as dense as air so that all the effects caused on the bullet in air are highly magnified in gelatin. For example, if the bullet should develop a yawing motion about its line of trajectory, that instability will increase greatly when the bullet encounters the gelatin.



One of the biggest advantages of using gelatin as a tissue simulant in ballistic research is that the gelatin model provides a visualization of the events, including the projectile path and the projectile-tissue interaction. Gelatin profile measures bullet penetration, deformation, fragmentation and the yaw along the path, as well as tissue disruption from both crush (permanent cavity) and stretch (temporary cavity). The projectile can be easily recovered, making this model ideal for forensics and the wound profile visualization has proved to be a tool for wound treatment. (by Engr Sarah Kaye C Paguio)

GA Sends 2nd TEST Mission this Year

The Government Arsenal (GA) sent its second team this year of technical personnel to conduct technical evaluation and surveillance of GA-manufactured small arms ammunition at various AFP units, this time in Southern Luzon and the Bicol Region last 14-22 May 2011.

The GA Technical Evaluation and Surveillance Team (TEST) was composed of Engr Dennis DS Chua as Team Leader and Mr. Bienvenido M Espinosa, Mr. Christopher G Bangco and Mr. Victor N Fabrigas Jr as members. They were joined by the AFP Team of Maj Frederick G Baradi, PN (M) from OJ4 as the Team Leader and Maj Soliman G Vistal PN (M), representative from AFPMCC.

The team carried out the objectives of their mission as follows in the different camps they visited:

- Conducted information drive about GA's small arms ammunition (SAA) manufacture, Quality Control procedures, ballistics and acceptance tests;
- Checked the serviceability of GA-manufactured SAA presently stored at AFP-FSSU Southern Luzon;
- Checked the present condition and serviceability of M16A1 rifles issued to AFP personnel assigned in Southern Luzon / Bicol area; and
- Conducted information dissemination / lecture on proper care and maintenance of weapons and appropriate handling and storage of ammunition

Specific places visited were Camp Guillermo Nakar, Lucena City; HQ 74th IB, 2nd ID PA, Barangay Ajos, Catanauan, Quezon; HQ 9th ID PA, Camp Elias Angeles, San Jose, Pili, Camarines Sur; 2nd IB, 9th ID PA, Brgy Tula-tula Grande, Ligao City, Albay; HQ 5th Forward Service Support Unit, Army Support Command PA, Lakandula Drive, Legaspi City; and PN HQ Naval Forces Southern Luzon, Naval Station Julhasan Arasain, Rawis, Legaspi City.

The Team emphasized that the performance of certain weapons does not only depend on the quality of the ammunition being used, but also on the actual condition of weapons (cleanliness and proper



maintenance), head space, pin indent, pin protrusion, rifling, bolt, trigger spring, firing pin, buffer, etc. Relative thereto, they demonstrated the use of gauges in checking the head space, pin indent and pin protrusion of the M16A1 rifles.

In their visit of the different camps and inspection of the storage facilities, the following were the general observations/information gathered:

- GA-manufactured ammunition packed in plastic crates were already in the inventory of the 4FSSU and 5 FSSU;
- Some ammunition issued to soldiers were already stained and corroded;
- The FSSU do not have the required armorer's measuring tools such as bore scope/gage, micrometer and dial gage to check head space, pin protrusion and pin indent, which is a must if re-barreling of M16A1 is being performed; and
- Out of 157 weapons inspected, 61 units or 38.90% were found to have deficiencies, which the team fixed/corrected.

As a result of the visit to the different military camps, the Team came up with the following recommendations for the benefit and safety of our soldiers in the field :

- Designation of an Armorer / Weapon Technician in every camp to be responsible in the proper care and maintenance of soldiers' firearms for weapons operational readiness;
- Issuance of maintenance kit to every soldier for the regular maintenance of the weapon issued to each of them to avoid malfunction;
- FSSUs to have Armorer's tools, measuring instruments and check gages to measure head space, pin protrusion and firing pin indent to determine the serviceability of the weapons, and ensure that these are already available before re-barreling of M16A1 rifles by the FSSUs; and
- Strict implementation of the First-In, First-Out policy in the issuance of ammunition to prevent long storage and issuance of already old ammunition that have accumulated stains and

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QUALITY ASURANCE DIVISION CONDUCTS QUALITY CONTROL COURSE

The Quality Assurance Division (QAD), in collaboration with the Training and Career Development Section (TCDS) of Administrative Division, conducts the Quality Control Course (QCC) for the Inspection of Metallic Raw Materials. The course started on September 12, 2011, and will run for 18 days.

The objectives of the course are: to train personnel on the inspection of various metallic raw materials such as brass strip, commercial bronze, carbon steel strip and lead wire; to provide the participants an opportunity to be accredited and considered in the inspection of raw materials; and to develop a pool of inspectors for the pre-delivery inspection of materials at the manufacturer's plant site.

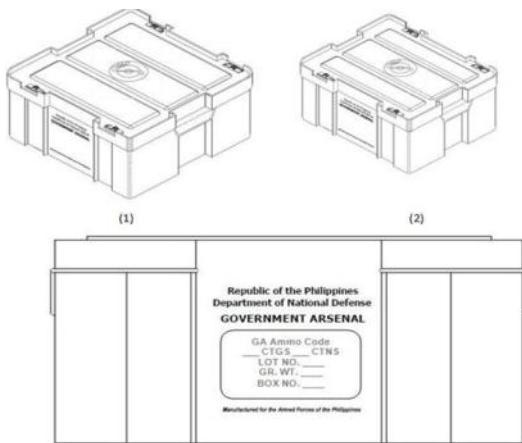
The course consists of two (2) phases. Phase I is purely lecture which includes the details of the inspection to include

the computation/allocation of samples and physical and chemical tests. Phase II covers the hands-on training; on-site sampling, visual and gaging at the warehouse where the materials are stored; actual conduct of physical tests such as grain size, hardness, tensile strength and elongation and the chemical analysis at the QAD laboratory. Only those who will pass the written examination of Phase I will proceed to Phase II. Passing the course after completion of Phase II will entail passing of the hands-on examination and the final written examination, and compliance to the attendance requirement.

The forty-one participants of the course consist of civilian officials and supervisors, engineers, other personnel with potential to be inspectors abroad and military officers detailed in GA. (by Ms Hiyasmin O Karunungan)

CONTINUOUS R&D FOR PACKAGING INNOVATION

The shift from the use of conventional wooden crates and ammo tin cans to high density polyethylene (HDPE) plastic crates and vacuum-sealed nylon-laminated polyethylene (PE) plastic bags with silica gel for 5.56 mm ammo packaging was conceived in CY 2006 and initially implemented in CY 2008. Since then, this packaging innovation did not only give 5.56 mm packaging an impressive and brand new look but also significantly improved the storage quality of ammunition due to its additional attributes as confirmed by favourable weather test results.



Under the leadership of Director Jonathan C. Martir, GA's thrust towards modernization continued its path to realization. Like any other work in progress, there is always a room for improvement. No matter how remarkable, the preliminary innovation is just a springboard for more superior innovations in the future. With the Director's guidance and inputs to further improve the existing features of the plastic crate, Engineering Division consolidated several ideas to come up with a more advanced design that fits the criteria for better ammunition storage, and further showcasing that the packed product is GA-manufactured.

The improved design includes the following new features:

- an embossed marking on opposite sides of the crate bearing the identification of the department / bureau and intended user;
- a transparent sticker on opposite sides of the crate bearing the important product details (new GA ammo code, capacity and lot no.);
- improved slip lock assembly and pin lock for security against pilferage; and
- embossed GA logo on the crate top cover having a matte finish and rubber gasket made from sponge rubber anti-ozone (ethylene propylene diene monomer) on the inner cover to further ensure air and water tightness of packed ammo.

For flexibility of use, the improved plastic crate with its original dimensions of 362 mm x 354 mm x 133 mm is intended for several types of ammunition such as the GA 556100 (5.56 mm M193), GA 556110 (5.56 mm M855), GA 556400 (5.56 mm blank), GA 762100 (7.62 mm M80) and GA 762105 (7.62 mm M80A). On the other hand, a smaller plastic crate (270 mm x 210 mm x 143.5 mm) was developed for GA

45100/45105 (Cal .45) with the same capacity of 1,000 rds as the Cal .45 wooden crate packaging for ease of handling.

The extensive R & D work was completed and finally approved in August 2011 and now underway towards procurement and implementation

The next target of packaging research and development due for adoption in 2012 is the replacement of the heavy and corrosion-prone metal box for linked ammunition (5.56 mm M855 and 7.62 mm M80/M80A) with high density polyethylene (HDPE) plastic box. The concept is to eliminate the use of wire-bound wooden crate to eliminate the problem on lumber sourcing and termite infestation. The original box design shall be adopted, but with inclusion of provision for nylon-strapping of three (3) plastic boxes per set maintaining the same capacity as the wooden crate. The use of olive drab color, transparent sticker, embossed marking and EDPM rubber gasket shall also be applied.

Apparently, these efforts are just geared towards matching the high-quality ammunition that GA manufactures, with equally superior quality packaging. (by Engr. Natalie Czarina C. Daclan)

(Continued from page 3) Government Arsenal (GA) M-16 Manufacturing Project

with the heavy end forward of the round A2 handguards and 1:7 RH twist, bayonet lug and GA muzzle brake; fixed carry handle and A2 sights on upper receiver with forward bolt assist, standard A2 front sights, telescopic buttstock; provision for grenade launcher; semi and select fire.

The rifle as described will provide the standard service rifle for the AFP, and will replace the M-16A1.

3. DMR/SPR model: (Designated Marksman Rifle/Special Purpose Rifle): 18 inch free-floated Bull barrel with 1:7 RH twist and standard A2 flash suppressor; flattop upper receiver with Picatinny rail, fixed A1 or other buttstocks as may be determined; provisions for bipod; semi and select fire;

The DMR/SPR will meet the requirement for a 5.56mm rifle to engage targets up to 800 meters with optics. It represents a continuing development from the 5.56mm Marine Scout Sniper Rifle (MSSR) which was introduced in 1996 and continues to serve as the primary range sniper rifle of the Philippine Marine Corps, in addition to the PN Night Fighting Weapon System (NFWS).

The Way Forward:

The key to the continuing use and popularity of the AR-15 rifle systems is the rifle's ability to adapt and evolve.

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GA Sends 2nd Test Mission This Year
corrosion, and proper ventilation of ammunition storage facilities/depot.

On the other hand, it was gratifying to know from the survey conducted by the Team that a large majority of the respondent soldiers are satisfied with the performance and quality of GA-manufactured ammunition (88.60%), and prefer to use GA-manufactured ammunition over those from other sources (82.10%). (Condensed from the TEST After-mission Report)

FEATURED PERSONNEL

ENGR DENNIS DS CHUA

*Assistant Superintendent,
Quality Assurance Division*



Engr. Dennis Chua or Dennis as he is fondly called by his peers, is an epitome of a person who dreamed big and just followed his passion to turn that dream into reality.

Engr. Chua is a Chinoy by blood, born of a Chinese father and a Filipina mother on January 24, 1967 in Rizal, Makati City. He is now married to Ms Rency Valencia, a teacher by profession, to whom he has one son, Lance Matthew.

Having finished a two-year Drafting Technology course, he started work at the Government Arsenal in 1987 as a Mechanical Draftsman of Engineering Division, which he served for 9 years and where his technical skills were honed and his passion for mechanical design jobs and research works pertaining to ammunition and firearms were developed. He was afterwards designated as Mechanical Designer in the same division until 1997. It was also during his years at the Engineering Division when he persevered to pursue higher studies and earned a degree in B.S. Mechanical Engineering and finally passed the licensure examination on October 12, 1998.

Engr. Chua could have been lured by the bright prospects of working abroad, but he chose to stay with the GA, setting aside financial gains for the love of work and the challenges that his job still has to offer.

In recognition of his having completed his college degree, Engr. Chua was soon assigned at Quality Assurance Division as Chief, Ballistics Group and later on was entrusted with higher responsibilities as Chief, In-process Section. Last year, he was given a much higher challenge when he was designated as Assistant Superintendent of Quality Assurance Division, in concurrent capacity as Chief, Acceptance Section.

Engr. Chua combines his attitude of a dedicated worker with his passion for research works when it comes to latest developments in ammunition and firearms. Without a formal training in ammunition and firearms design for the apparent reason that this kind of learning is not available in-country, Engr. Chua makes use of the internet to further his technical knowledge in this field. This keeps him updated with the current trends and technology as far as weapon systems and ammunition are involved, something that proves beneficial to the GA, as he is very much involved in solving the technical problems in the plants and developmental projects.

In September 2009, he received recognition as GA's Exemplary Supervisor and was given award during the CSC-DND celebration.

With his experience and technical know-how, he was sent to several foreign missions for the inspection of various raw materials and components needed in ammunition manufacture and through invitations from the AFP delegation in the acceptance of their procured ammunition. Tasked to perform missions on official travel, he has visited countries like South Korea, South Africa, Brazil, China and Austria where he made it a point to observe best manufacturing practices in these countries for possible adoption in GA.

Engr. Chua believes that the real essence of life is finding a purpose, and turning that purpose into reality.

RECOGNIZING GOOD PERFORMERS...

For their distinct good traits and work performance, they bested all others at GA for these awards in the CSC (Exemplary Supervisor and Employee) and the DND (Model Supervisor and Employee):

GA EXEMPLARY SUPERVISOR 2011 – MS ROWEEENA G BASA



Ms Basa is the Assistant Superintendent of Planning & Logistics Division, and concurrent Chief, Procurement Section. Handling dual tasks, she attends to the functions of the division, while at the same time makes sure that procurement matters, including those elevated to the DND BAC are acted upon promptly, documents are

submitted on time and in compliance to the requirements of the procurement law. Holding a position of trust, she has maintained a strong stance on honesty and integrity, especially in dealing with suppliers – traits which are worthy of emulation by her subordinates and peers.

GA EXEMPLARY EMPLOYEE 2011- MR EDUARDO A ALEJANDRO



Mr Alejandro is assigned at the GA Safety and Security Office as Chief, Fire Prevention and Protection Group. Due to exigency of service, he was later given the responsibility to act as Chief, Ground Maintenance and Janitorial Services Group, in concurrent capacity. He willingly accepted the additional responsibility even if it requires

working beyond office hours and on weekends, to ensure cleanliness of surroundings and facilities for visitors staying inside the camp. Being trustworthy, hardworking and a hands-on supervisor, he easily got the respect and command of his subordinates.

GA MODEL SUPERVISOR 2011 – MS SALLY A MERAM



Ms Meram is the Assistant Superintendent of Finance and Management Division and concurrent Chief, Budget Section. As Budget Officer, she is always prompt in the preparation of the agency's budget estimates and proposals. Her efficiency, dedication to work, and good management of people enables the office to submit all reports required by the DBM ahead of time and the prompt payment of all legitimate claims.

GA MODEL EMPLOYEE 2011 – MR JOEY F FETALCORIN



Mr. Fetalcorin is assigned as Technician, Link/Primer/Cartridge QC Group, Quality Assurance Division, where he was instrumental in the repair and calibration of the already defective and unserviceable Hardness Tester being used in the production line. Through his ingenuity and

resourcefulness by making use of substitute parts, he was able to repair the defective equipment at no additional cost to the GA.



ATK Corporation, USA



ABRAMS Corp., USA



Battalion Station
Philippine Navy



Air Logistics Command
Philippine Air Force



46th MNSA Graduating Class
NDCP



ASCOM
Philippine Army



Safety Inspection



Executives' Fun Run